

## Measurement of the $^{14}\text{N}(n,p)$ reaction for BNCT dose calculations

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Nitrogen is an element of key relevance in BNCT, since its interaction with thermal neutrons following the  $^{14}\text{N}(n,p)$  reaction gives a major contribution to the dose in healthy tissue. An accurate knowledge of the cross-section for this reaction is fundamental for the dosimetry and treatment planning in BNCT. There is a 5% discrepancy between ENDF and JENDL evaluations at thermal energy and even higher differences between the experimental data, being some of them in disagreement with the evaluations. In addition, the experimental data at higher energies in the keV region do not match with the extrapolations from the thermal energy. These discrepancies can produce deviations of up to a 10% in the total dose delivered to healthy tissue. Hence, solving this and reducing the uncertainty in dose at the normal tissue at treatment planning is important for the determination of the dose at the organs of risk. For these reasons, a measurement of the  $^{14}\text{N}(n,p)$  reaction cross-section was carried out at the neutron time of flight (n\_TOF) facility of CERN [1], in order to measure the cross-section from below thermal energy to the first resonance near 500 keV. Thin adenine foils had to be used so that the low energy protons from the reaction could escape from the samples, in order to overcome the challenge of detecting them. Two different setups were used for this measurement, one of them based on MicroMegas detectors and the other on Double-Sided Silicon Strip Detectors (DSSSD). The MicroMegas setup could be placed inside the beam due to its high neutron transparency, and also profiting from the large geometrical efficiency. On the other side, the DSSSD had to be placed off-beam, which reduced the background, and the detector strips could allow a study on the anisotropy of the reaction. Preliminary results of the cross-section measured will be shown.

### References

- [1] J. Praena, I. Porras, M. Sabaté-Gilarte, F. Ogállar, P. Torres-Sánchez, C. Lederer-Woods, T. Davinson, M. Dietz, S.J. Lonsdale, P.J. Woods, M. Barbagallo, J. Andrzejewski, J. Perkowski, S. Cristallo, C. Abia, F. Arias de Saavedra, *et al* n\_TOF collaboration. *The  $^{14}\text{N}(n,p)^{14}\text{C}$  and  $^{35}\text{Cl}(n,p)^{35}\text{S}$  reactions at n\_TOF-EAR2: dosimetry in BNCT and astrophysics*. CERN Document Server: proposal CERN-INTC-2017-039/INTC-P-510: <https://cds.cern.ch/record/2266484/>.